REMARKS

The Examiner is thanked for the comments in the Action. They have helped us considerably in understanding her rationale therein and in drafting this Response thereto.

It is our understanding that claims 1-60 remain pending in this application. Claims 1, 18, 32-35, and 49 have been amended for reasons specifically remarked upon, below. And claims 7, 9, 10, 24, 26, 27, 40, 41, 54 and 55 have been acknowledged by the Examiner as being directed to allowable subject matter.

Preliminary items:

We respectfully ask entry of the amendments to the specification made herein, to correct errors noted in preparing this Response. Obvious errors are corrected in straightforward manner. In one case a callout 868 is corrected to 866, but this can be seen to be correct when taken in context and by reference to FIG. 19.

The meaning of "multi-dimensional grating" seems to have caused considerable confusion. To eliminate confusion with mere physical dimensions, of which there are always three, we have herein amended claims 1, 18, 35, and 49 to emphasize that <u>optically</u> multi-dimensional gratings are meant.

All physical objects occupy three physical dimensions, as they must, and speaking of dimensions here only has meaning with respect to optical activity. Linear gratings (e.g., FIG. 3 and 11) can operate on only one light wavelength, i.e., one optical dimension. Planar gratings (e.g., FIG. 12) can operate on at least two optical dimensions. By control of cell-to-cell spacings in two physical dimensions, a planar grating is optically active in two optical dimensions. Furthermore, by control of surface-to-surface spacing (spacing between surfaces in each cell) spacings in two physical dimensions, a planar grating is optically active in two optical dimensions. By controlling both cell-to-cell and surface-to-surface spacings in two physical dimensions, a planar grating can operate on up to four different specific light wavelengths, or it can more strongly operate on as few as one. Cubical gratings (e.g., FIG. 13 and 20) employ cell-to-cell and/or surface-to-surface spacings in three physical to dimensions, to operate on up to six different specific light wavelengths. No new subject matter is added by these amendments (see e.g., the cited figures and the discussion of them starting a pg. 20, ln. 25).

We proceed now with reference specifically to the items in the Action.

Item 1 (Information Disclosure Statement, Drawings, and Conclusion):

We thank the Examiner for handling/noting these. Otherwise, they appear informational in nature and are understood to require no reply.

Item 2 (Objection to the Specification):

The Examiner has correctly objected because the abstract exceeds 150 words. Responsive to this the abstract is herein amended. No new subject matter is added by this amendment.

Item 3 (§112, ¶2 rejections):

The Examiner has correctly rejected claims 32-34 as being indefinite because claim 32 recited "*the de-multiplexing system of claim 32*" and claims 33 and 34 depended from claim 32.

In reviewing this item it has been discovered that all of claims 32-34 should have instead recited dependence from claim 31. Accordingly, claims 32-34 are herein amended.

Item 4 (§103 rejections in view of Grann, part 1 of 3):

Claims 1-6, 8, 11-23, 25, 28-39, 42-53 and 56-60 have been rejected as unpatentable (obvious) over Grann. We urge that there has been confusion between physical and optically active dimensions, discussed above in detail. In a responsive spirit, however, we have amended all of the independent claims to emphasize that optically multi-dimensional gratings are meant.

Respectfully, we further urge that Grann has been misinterpreted. It teaches a plurality of optically separate, one-dimensional grating filters 10a-e (Fig. 3). These optically "uni-dimensional" grating filters 10a-e (plural) are collectively assembled into a larger, physically three-dimensional construct, but they still each operate by use of one optical dimension to work with one light wavelength apiece. In contrast, the claimed invention employs a true optically multi-dimensional grating (singular).

Turning now to the Action specifically, we make the following remarks on points possibly needing further clarification. Apparently addressing claims 4 and 38, the Action states "*Grann et al. discloses ... - wherein the multi-dimensional grating has characteristics suitable for diffracting a plurality of wavelengths concurrently;....*" However, this is not correct. The optically uni-dimensionally grating filters 10a-e of Grann work sequentially, not "concurrently."

The Action does not seem to discuss claims 5-6 and 39 at all.

The Action continues, apparently with intent to read on claim 8, by stating "...- *wherein the multi-dimensional gratings is a cubical grating formed by an array of planar gratings (10a, 10b, 10c, 10d, 10e);...*." Respectfully, claim 8 recites a cubical grating, and not how it is formed. The block 20 of Grann is formed by aggregating a plurality of its grating filters 10a-e together, but those are not "planar gratings" and the result is not a "cubical grating" as the present application teaches such. By review of Applicants' Fig. 13, 23, 25, 27, or 29 and recalling that the cells therein represent thousands, tens of thousands or even more actual cells, it can be appreciated that a cubical grating could never be formed by simply aggregating together hundreds or thousands or micro-meter range thick slices (not that such slices would be "planar gratings" in any relevant sense here, anyway).

As regards the claims under this rejection which are not specifically discussed above, these all depend from at least claims 1 or 35 and we accordingly submit that all of these claims are also allowable for at least the reasons stated.

<u>Item 5 (§103 rejections in view of Grann, continued, part 2 of 3):</u>

The Action continues, stating "*Regarding claims 14-17 and 45-48; Grann et al. teaches all of the limitations of these claims as applied above. The multiplexing system disclosed in Figure 3 of Grann et al. includes: ... - a plurality of multi-dimensional gratings (10a, 10b, 10c, 10d, 10e) suitably arranged to form at least one and as many as three input grating blocks and an output grating block;...*." However, as discussed above, what Grann teaches is a block 20 of its optically uni-dimensional grating filters 10a-e.

The Action continues, stating "...- *wherein the <u>input gratings blocks</u> are suitably arranged to receive one of the input light beams and to diffractably provide its wavelength or wavelengths to the output grating block; - wherein the <u>output grating block</u> is suitably arranged to receive the wavelengths from the input grating blocks and to diffractably combine the wavelengths such that they are present in the output light beam;...* (emphasis added)." However, Grann does not teach or reasonably suggest any use for a plurality of its simple blocks 20. In Fig. 6 it teaches a single block using a triple sub-filter arrangement (col. 4, ln. 50-68), but this is merely for better channel separation. This arrangement could not achieve, for instance, wavelength "combing" (see e.g., Applicants' Fig. 30-33).

The Action continues, apparently with intent to read on claims 15 and 47, by stating "...-*wherein the multi-dimensional gratings (10a, 10b, 10c, 10d, 10e) are planar gratings and two input grating blocks provide wavelengths sets to the output grating block;....*" Respectfully, Grann nowhere teaches or reasonably suggests a two input block to one output block arrangement. With reference to its Fig. 3 (and then 20/20 hindsight based on the present application) it can be seen that some sub-portion of Grann's grating filters 10a-e in an output block would have to be rotated to accept light from multiple input blocks to even function theoretically. Pragmatically, this would be difficult or impossible to actually impliment, considering how Grann teaches "assembling" its individual grating filters 10a-e together (see e.g., its abstract).

The Action continues, apparently with intent to read on claims 16 and 48, by stating "...-*wherein the gratings in the output grating block are* *<u>cubical gratings</u>*, ... (emphasis added)" However, this is flawed for the same rationale as the above and claim 15, only here with respect to a cubical rather than a planar grating based output block.

As regards the claims under this rejection which are not specifically discussed above, these all depend from at least claims 1 or 35 and we accordingly submit that all of these claims are also allowable for at least the reasons stated.

<u>Item 6 (§103 rejections in view of Grann, further continued, part 3 of 3):</u>

The Action continues, stating "*Regarding claims 18-23, 25, 28-34, 49-53 and 56-60; Grann et al. discloses all of the limitations of claims 18-20 as applied above.*" By amendment we have now clarified the distinctions of the claimed invention over Grann, and by the remarks above we have shown that Grann does not teach or reasonably suggest the claimed invention. Accordingly we submit that all of these claims are also allowable for at least the reasons stated.

<u>Item 7 (Allowable Subject Matter):</u>

Claims 7, 9, 10, 24, 26, 27, 40, 41, 54 and 55 have been objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. We thank the Examiner for this indication and for the reasoned supporting statement. In view of the amendments herein to the

base claims and our remarks above, we urge that all of the claims, including these, should now be allowable.

CONCLUSION

Applicant has endeavored to put this case into complete condition for allowance. It is thought that the §112 rejections have all been corrected by amendment and that the §103 rejections have also been addressed by amendment or have been completely rebutted. Applicant therefore asks that all objections and rejections now be withdrawn and that allowance of all claims presently in the case be granted.

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